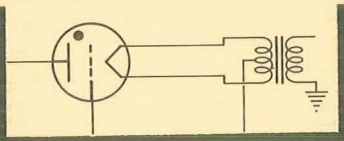
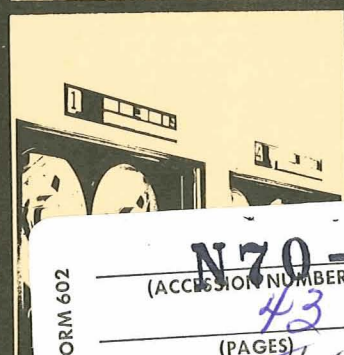
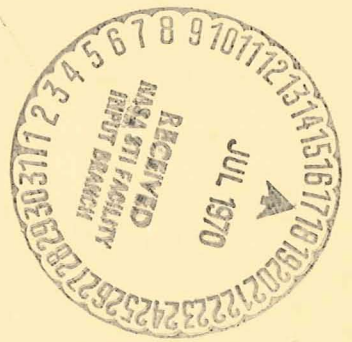
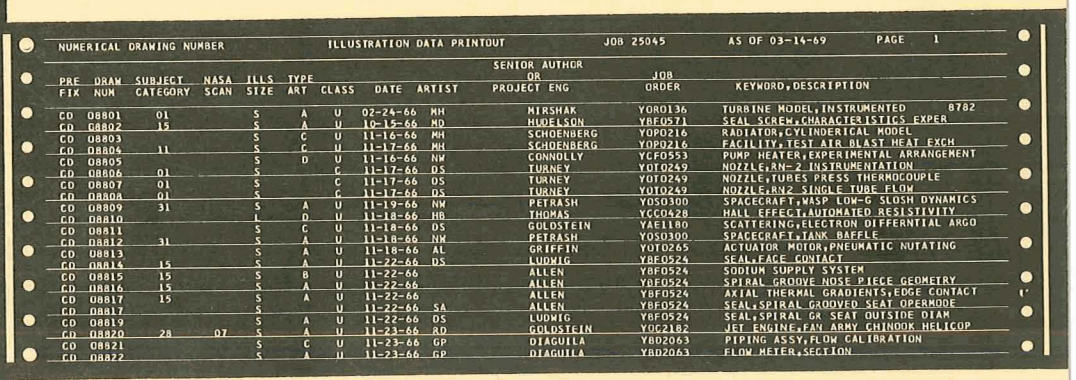


GRAPHIC INFORMATION PROCESSING SYSTEM



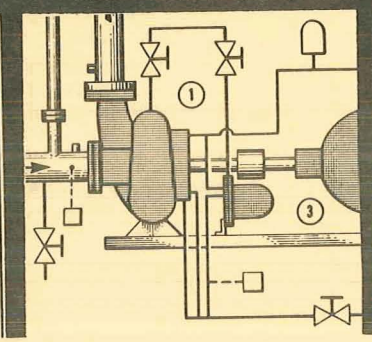


GENERAL INFORMATION MANUAL



NUMERICAL DRAWING NUMBER — ILLUSTRATION DATA PRINTOUT — JOB 25045 — AS OF 03-14-69 — PAGE 1

PRE FIX	DRAW NUM	SUBJECT CATEGORY	NASA SCAN	ILLS SIZE	TYPE ART	CLASS	DATE	ARTIST	SENIOR AUTHOR OR PROJECT ENG	JOB ORDER	KEYWORD,DESCRIPTION
CO	08801	01		S	A	U	02-24-66	MH	MIRSHAK	YOR0136	TURBINE MODEL,INSTRUMENTED 8782
CO	08802	15		S	A	U	10-15-66	MD	HUDELSON	YBF0571	SEAL SCREW,CHARACTERISTICS EXPER
CO	08803			S	C	U	11-16-66	MH	SCHOENBERG	YOP0216	RADIATOR,CYLINDERICAL MODEL
CO	08804	11		S	C	U	11-17-66	MH	SCHOENBERG	YOP0216	FACILITY,TEST AIR BLAST HEAT EXCH
CO	08805			S	D	U	11-16-66	NW	CONNOLLY	YCF0553	PUMP HEATER,EXPERIMENTAL ARRANGEMENT
CO	08806	01		S		C	11-17-66	DS	TURNEY	YOT0249	NOZZLE,RN-2 INSTRUMENTATION
CO	08807	01		S		C	11-17-66	DS	TURNEY	YOT0249	NOZZLE,TUBES PRESS THERMOCOUPLE
CO	08808	01		S		C	11-17-66	DS	TURNEY	YOT0249	NOZZLE,RN2 SINGLE TUBE FLOW
CO	08809	31		S	A	U	11-19-66	NW	PETRASH	YOS0300	SPACECRAFT,WASP LOW-G SLOSH DYNAMICS
CO	08810			L	D	U	11-18-66	HB	THOMAS	YCC0428	HALL EFFECT,AUTOMATED RESISTIVITY
CO	08811			S	C	U	11-18-66	DS	GOLDSTEIN	YAE1180	SCATTERING,ELECTRON DIFFERNTIAL ARGO
CO	08812	31		S	A	U	11-18-66	NW	PETRASH	YOS0300	SPACECRAFT,TANK BAFFLE
CO	08813			S	A	U	11-18-66	AL	GRIFFIN	YOT0265	ACTUATOR MOTOR,PNEUMATIC NUTATING
CO	08814	15		S	A	U	11-22-66	DS	LUDWIG	YBF0524	SEAL,FACE CONTACT
CO	08815	15		S	B	U	11-22-66		ALLEN	YBF0524	SODIUM SUPPLY SYSTEM
CO	08816	15		S	A	U	11-22-66		ALLEN	YBF0524	SPIRAL GROOVE NOSE PIECE GEOMETRY
CO	08817	15		S	A	U	11-22-66		ALLEN	YBF0524	AXIAL THERMAL GRADIENTS,EDGE CONTACT
CO	08817			S		U	11-22-66	SA	ALLEN	YBF0524	SEAL,SPIRAL GROOVED SEAT OPERMODE
CO	08819			S	A	U	11-22-66	DS	LUDWIG	YBF0524	SEAL,SPIRAL GR SEAT OUTSIDE DIAM
CO	08820	28	07	S	A	U	11-23-66	RD	GOLDSTEIN	YOC2182	JET ENGINE,FAN ARMY CHINOOK HELICOP
CO	08821			S	C	U	11-23-66	GP	DIAGUILA	YBD2063	PIPING ASSY,FLOW CALIBRATION
CO	08822			S	A	U	11-23-66	GP	DIAGUILA	YBD2063	FLOW METER,SECTION



National Aeronautics and Space Administration
Lewis Research Center • Cleveland, Ohio

GRAPHIC INFORMATION PROCESSING SYSTEM

GENERAL INFORMATION MANUAL

by Murray H. Henderson

Management Services Division
LEWIS RESEARCH CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1969
Cleveland, Ohio

ABSTRACT

The makeup and use of the Graphic Information Processing System are described. The System is a computer/microfilm cataloging of illustrations and graphics by drawing number, category, title, and pictures.

CONTENTS

ILLUSTRATIONS

INTRODUCTION

The Graphic Information Processing System establishes an identification structure for the various graphics produced by the Illustration Section of the Management Services Division when used in conjunction with electronic data processing methods and permits the systematic cataloging of the graphic information resources of the Center. The section head of the Illustration Section exercises supervision over the system, and the section implements and applies the system to the existing procedures of the Center (see fig. 1).

The coding of the system is designed to meet most graphic information filing needs. It is also capable of being extended to such areas as photography, statistical drafting, and library methods. The system uses the so-called descriptive keyword indexing system modified for compatability with the various NASA Lewis coding schemes and the Center's existing computer facilities.

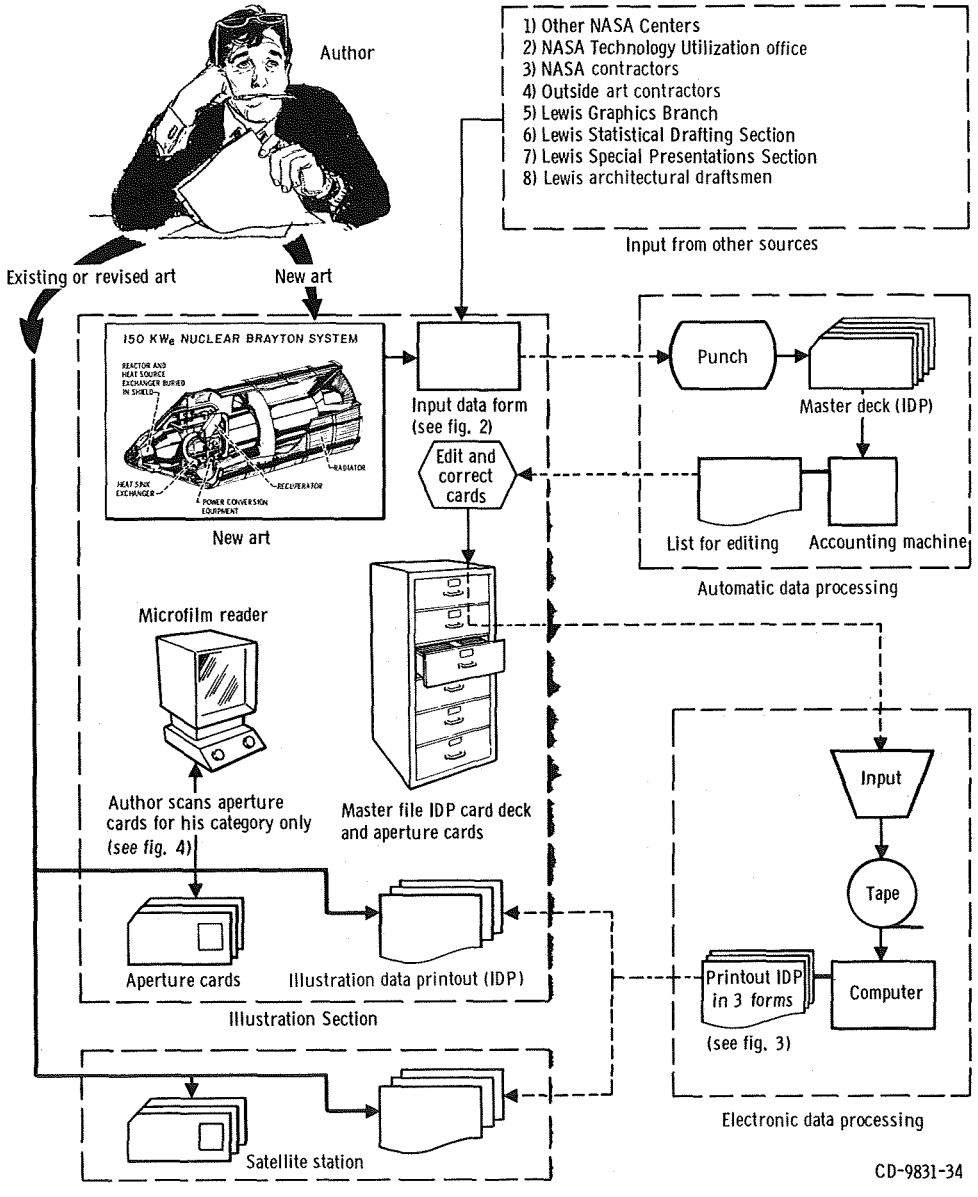


Figure 1. - Lewis Graphic Information Processing System.

The graphics prepared by the Illustration Section are identified in accordance with the descriptions required on the input data form (fig. 2). The resulting identification can then be translated into a machine-readable card. The processing of this card produces a variety of useful data elements for the system.

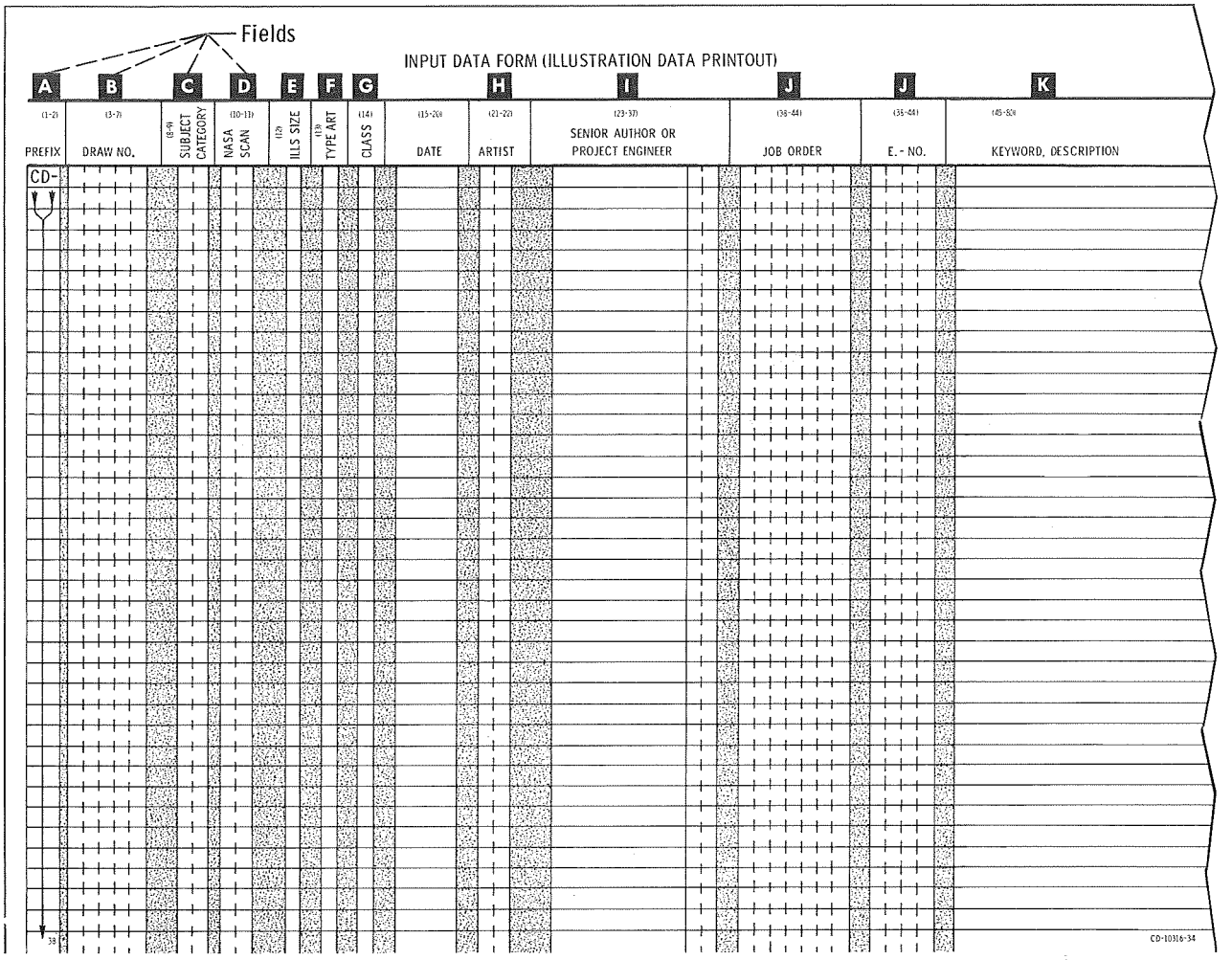
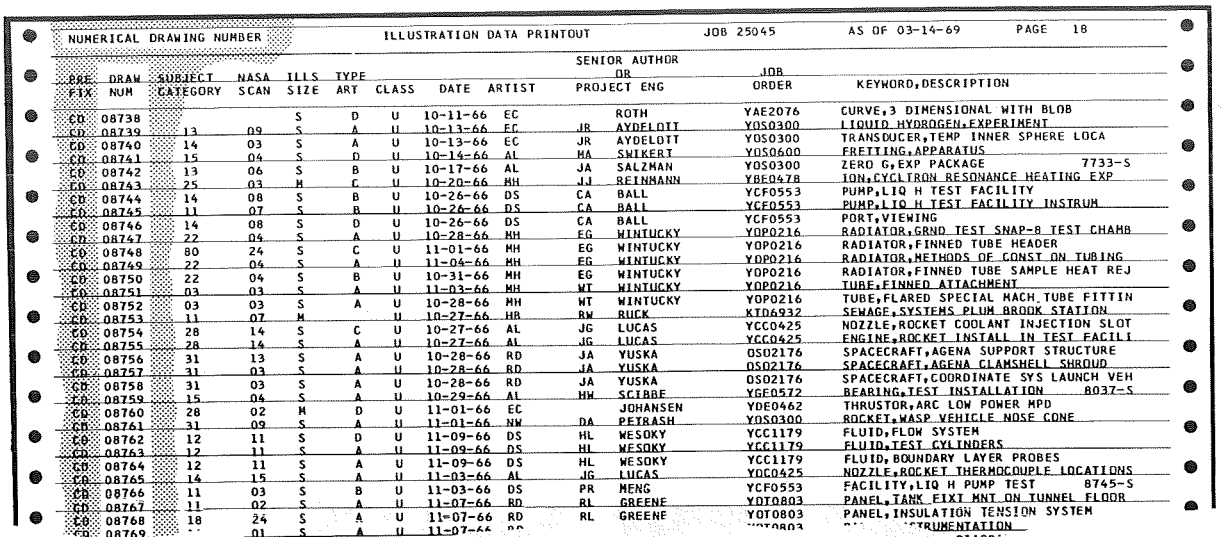


Figure 2. - Input data form.

A computer printout entitled illustration data printout (IDP) is updated periodically and printed in three forms. Each form contains all the fields listed in this manual (see fig. 3). In the first form, field B (illustration file number) is listed in numerical order; in the second, fields C and D (subject category and NASA/SCAN topics) are listed in numerical order; and in the third, field K (description) is listed in alphapetical order. The second and third forms are the most helpful to the authors.

Note that the computer scans the description from left to right until it hits the first comma, and only this keyword or keywords are put into alphabetical order, not the complete description.

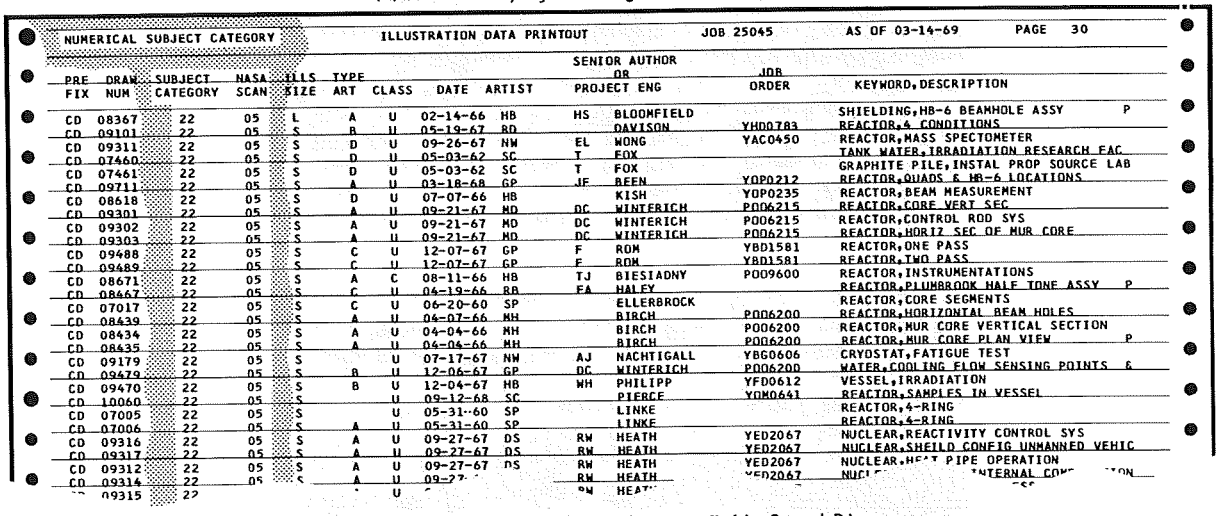
The illustration data printout, microfilm aperture cards, microfilm reader, original artwork, and 8 by 10 inch artwork negatives are all located in the Illustration Section.



NUMERICAL DRAWING NUMBER — ILLUSTRATION DATA PRINTOUT — JOB 25045 — AS OF 03-14-69 — PAGE 18

PRE FIX	DRAW NUM	SUBJECT CATEGORY	NASA SCAN	ILLS SIZE	TYPE ART	CLASS	DATE	ARTIST	SENIOR AUTHOR OR PROJECT ENG	JOB ORDER	KEYWORD,DESCRIPTION
CD	08738			S	D	U	10-11-66	EC	ROTH	YAE2076	CURVE,3 DIMENSIONAL WITH BLOB
CD	08739	13	09	S	A	U	10-13-66	EC	JR AYDELOTT	YOS0300	LIQUID HYDROGEN,EXPERIMENT
CD	08740	14	03	S	A	U	10-13-66	EC	JR AYDELOTT	YOS0300	TRANSDUCER,TEMP INNER SPHERE LOCA
CD	08741	15	04	S	D	U	10-14-66	AL	HA SWIKERT	YOS0600	FRETTING,APPARATUS
CD	08742	13	06	S	B	U	10-17-66	AL	JA SALZMAN	YOS0300	ZERO G,EXP PACKAGE 7733-S
CD	08743	25	03	H	C	U	10-20-66	MH	JJ REINMANN	YBE0478	ION,CYCLTRON RESONANCE HEATING EXP
CD	08744	14	08	S	B	U	10-26-66	DS	CA BALL	YCF0553	PUMP,LIQ H TEST FACILITY
CD	08745	11	07	S	B	U	10-26-66	DS	CA BALL	YCF0553	PUMP,LIQ H TEST FACILITY INSTRUM
CD	08746	14	08	S	D	U	10-26-66	DS	CA BALL	YCF0553	PORT,VIEWING
CD	08747	22	04	S	A	U	10-28-66	MH	EG WINTUCKY	YDP0216	RADIATOR,GRND TEST SNAP-8 TEST CHAMB
CD	08748	80	24	S	C	U	11-01-66	MH	EG WINTUCKY	YDP0216	RADIATOR,FINNED TUBE HEADER
CD	08749	22	04	S	A	U	11-04-66	MH	EG WINTUCKY	YDP0216	RADIATOR,METHODS OF CONST ON TUBING
CD	08750	22	04	S	B	U	10-31-66	MH	EG WINTUCKY	YDP0216	RADIATOR,FINNED TUBE SAMPLE HEAT REJ
CD	08751	03	03	S	A	U	11-03-66	MH	WT WINTUCKY	YDP0216	TUBE,FINNED ATTACHMENT
CD	08752	03	03	S	A	U	10-28-66	MH	WT WINTUCKY	YDP0216	TUBE,FLARED SPECIAL MACH TUBE FITTIN
CD	08753	11	07	M		U	10-27-66	HR	RW RUCK	KTD6932	SEWAGE,SYSTEMS PLUM BROOK STATION
CD	08754	28	14	S	C	U	10-27-66	AL	JG LUCAS	YCC0425	NOZZLE,ROCKET COOLANT INJECTION SLOT
CD	08755	28	14	S	A	U	10-27-66	AL	JG LUCAS	YCC0425	ENGINE,ROCKET INSTALL IN TEST FACILI
CD	08756	31	13	S	A	U	10-28-66	RD	JA YUSKA	OSD2176	SPACECRAFT,AGENA SUPPORT STRUCTURE
CD	08757	31	03	S	A	U	10-28-66	RD	JA YUSKA	OSD2176	SPACECRAFT,AGENA CLAMSHELL SHROUD
CD	08758	31	03	S	A	U	10-28-66	RD	JA YUSKA	OSD2176	SPACECRAFT,COORDINATE SYS LAUNCH VEH
CD	08759	15	04	S	A	U	10-29-66	AL	HW SCIBBE	YGF0572	BEARING,TEST INSTALLATION 8037-S
CD	08760	28	02	M	D	U	11-01-66	EC	JOHANSEN	YDE0462	THRUSTOR,ARC LOW POWER MPD
CD	08761	31	09	S	A	U	11-01-66	NW	DA PETRASH	YOS0300	ROCKET,WASP VEHICLE NOSE CONE
CD	08762	12	11	S	D	U	11-09-66	DS	HL WESOKY	YCC1179	FLUID,FLOW SYSTEM
CD	08763	12	11	S	A	U	11-09-66	DS	HL WESOKY	YCC1179	FLUID,TEST CYLINDERS
CD	08764	12	11	S	A	U	11-09-66	DS	HL WESOKY	YCC1179	FLUID,BOUNDARY LAYER PROBES
CD	08765	14	15	S	A	U	11-03-66	AL	JG LUCAS	YDC0425	NOZZLE,ROCKET THERMOCOUPLE LOCATIONS
CD	08766	11	03	S	B	U	11-03-66	DS	PR MENG	YCF0553	FACILITY,LIQ H PUMP TEST 8745-S
CD	08767	11	02	S	A	U	11-07-66	RD	RL GREENE	YDT0803	PANEL,TANK FIXT MNT ON TUNNEL FLOOR
CD	08768	18	24	S	A	U	11-07-66	RD	RL GREENE	YDT0803	PANEL,INSULATION TENSION SYSTEM
CD	08769		01	S	A	U	11-07-66	RD			TRUMENTATION

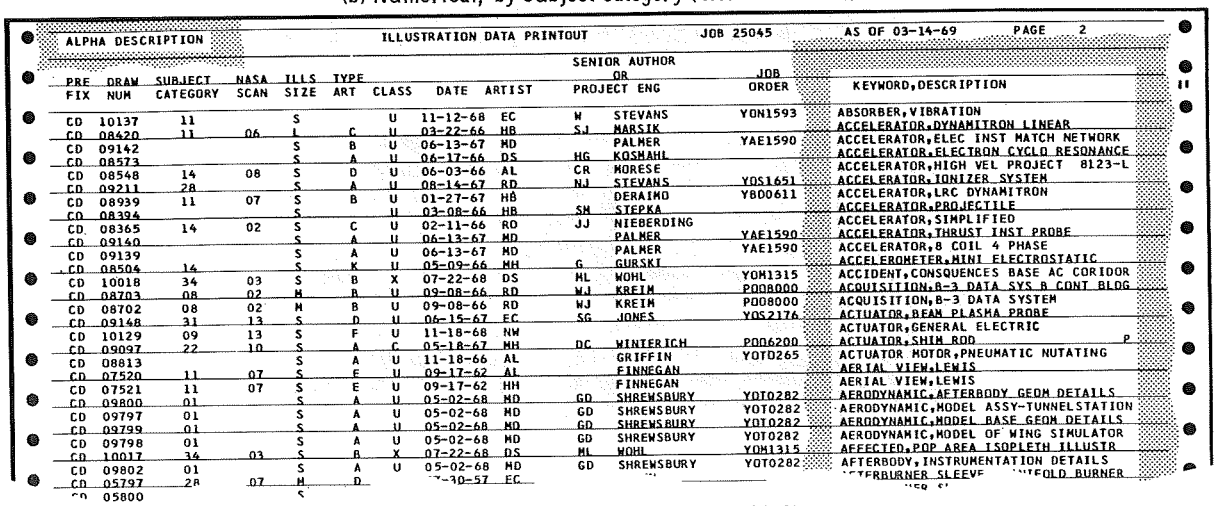
(a) Numerical, by drawing number (field B).



NUMERICAL SUBJECT CATEGORY — ILLUSTRATION DATA PRINTOUT — JOB 25045 — AS OF 03-14-69 — PAGE 30

PRE FIX	DRAW NUM	SUBJECT CATEGORY	NASA SCAN	ILLS SIZE	TYPE ART	CLASS	DATE	ARTIST	SENIOR AUTHOR OR PROJECT ENG	JOB ORDER	KEYWORD,DESCRIPTION
CD	08367	22	05	L	A	U	02-14-66	HB	HS BLOOMFIELD		SHIELDING,HB-6 BEAMHOLE ASSY P
CD	09101	22	05	S	B	U	05-19-67	RD	DAVISON	YHD0783	REACTOR,4 CONDITIONS
CD	09311	22	05	S	D	U	09-26-67	NW	EL WONG	YAC0450	REACTOR,MASS SPECTOMETER
CD	07460	22	05	S	D	U	05-03-62	SC	T FOX		TANK WATER,IRRADIATION RESEARCH FAC
CD	07461	22	05	S	D	U	05-03-62	SC	T FOX		GRAPHITE PILE,INSTAL PROP SOURCE LAB
CD	09711	22	05	S	A	U	03-18-68	GP	JF BEEN	YDP0212	REACTOR,QUADS & HB-6 LOCATIONS
CD	08618	22	05	S	D	U	07-07-66	HB	KISH	YDP0235	REACTOR,BEAM MEASUREMENT
CD	09301	22	05	S	A	U	09-21-67	MD	DC WINTERICH	PDD6215	REACTOR,CORE VERT SEC
CD	09302	22	05	S	A	U	09-21-67	MD	DC WINTERICH	PDD6215	REACTOR,CONTROL ROD SYS
CD	09303	22	05	S	A	U	09-21-67	MD	DC WINTERICH	PDD6215	REACTOR,HORIZ SEC OF MUR CORE
CD	09488	22	05	S	C	U	12-07-67	GP	F ROM	YBD1581	REACTOR,ONE PASS
CD	09489	22	05	S	C	U	12-07-67	GP	F ROM	YBD1581	REACTOR,TWO PASS
CD	08671	22	05	S	A	C	08-11-66	HB	TJ BIESIADNY	PDD9600	REACTOR,INSTRUMENTATIONS
CD	08447	22	05	S	C	U	04-19-66	RB	FA HALEY		REACTOR,PLUMBROOK HALF TONE ASSY P
CD	07017	22	05	S	C	U	06-20-60	SP	ELLERBROCK		REACTOR,CORE SEGMENTS
CD	08439	22	05	S	A	U	04-07-66	MH	BIRCH	PDD6200	REACTOR,HORIZONTAL BEAM HOLES
CD	08434	22	05	S	A	U	04-04-66	MH	BIRCH	PDD6200	REACTOR,MUR CORE VERTICAL SECTION
CD	08435	22	05	S	A	U	04-04-66	MH	BIRCH	PDD6200	REACTOR,MUR CORE PLAN VIEW P
CD	09179	22	05	S		U	07-17-67	NW	AJ NACHTIGALL	YBG0606	CRYOSTAT,FATIGUE TEST
CD	09479	22	05	S	B	U	12-06-67	GP	DC WINTERICH	PDD6200	WATER,COOLING FLOW SENSING POINTS &
CD	09470	22	05	S	B	U	12-04-67	HB	WH PHILIPP	YFD0612	VESSEL,IRRADIATION
CD	10060	22	05	S		U	09-12-68	SC	PIERCE	YDM0641	REACTOR,SAMPLES IN VESSEL
CD	07005	22	05	S		U	05-31-60	SP	LINKE		REACTOR,4-RING
CD	07006	22	05	S	A	U	05-31-60	SP	LINKE		REACTOR,4-RING
CD	09316	22	05	S	A	U	09-27-67	DS	RW HEATH	YED2067	NUCLEAR,REACTIVITY CONTROL SYS
CD	09317	22	05	S	A	U	09-27-67	DS	RW HEATH	YED2067	NUCLEAR,SHEILD CONFIG UNMANNED VEHIC
CD	09312	22	05	S	A	U	09-27-67	DS	RW HEATH	YED2067	NUCLEAR,HEAT PIPE OPERATION
CD	09314	22	05	S	A	U	09-27		RW HEATH	YED2067	NUCL INTERNAL CONF TION
CD	09315	22				U			RW HEAT		CES

(b) Numerical, by subject category (fields C and D).



ALPHA DESCRIPTION — ILLUSTRATION DATA PRINTOUT — JOB 25045 — AS OF 03-14-69 — PAGE 2

PRE FIX	DRAW NUM	SUBJECT CATEGORY	NASA SCAN	ILLS SIZE	TYPE ART	CLASS	DATE	ARTIST	SENIOR AUTHOR OR PROJECT ENG	JOB ORDER	KEYWORD,DESCRIPTION
CD	10137	11		S		U	11-12-68	EC	W STEVANS	YON1593	ABSORBER,VIBRATION
CD	08420	11	06	L	C	U	03-22-66	HB	SJ MARSIK		ACCELERATOR,DYNAMITRON LINEAR
CD	09142			S	B	U	06-13-67	MD	PALMER	YAE1590	ACCELERATOR,ELEC INST MATCH NETWORK
CD	08573			S	A	U	06-17-66	DS	HG KOSMAHL		ACCELERATOR,ELECTRON CYCLO RESONANCE
CD	08548	14	08	S	D	U	06-03-66	AL	CR MORESE		ACCELERATOR,HIGH VEL PROJECT 8123-L
CD	09211	28		S	A	U	08-14-67	RD	NJ STEVANS	YOS1651	ACCELERATOR,IONIZER SYSTEM
CD	08939	11	07	S	B	U	01-27-67	HB	DERAIMO	YBD0611	ACCELERATOR,LRC DYNAMITRON
CD	08394			S		U	03-08-66	HB	SN STEPKA		ACCELERATOR,PROJECTILE
CD	08365	14	02	S	C	U	02-11-66	RD	JJ NIEBERDING		ACCELERATOR,SIMPLIFIED
CD	09140			S	A	U	06-13-67	MD	PALMER	YAE1590	ACCELERATOR,THRUST INST PROBE
CD	09139			S	A	U	06-13-67	MD	PALMER	YAE1590	ACCELERATOR,8 COIL 4 PHASE
CD	08504	14		S	K	U	05-09-66	MH	G GURSKI		ACCELEROMETER,MINI ELECTROSTATIC
CD	10018	34	03	S	B	X	07-22-68	DS	HL WOHL	YOM1315	ACCIDENT,CONSQUENCES BASE AC CORIDOR
CD	08703	08	02	M	B	U	09-08-66	RD	WJ KREIM	PDD8000	ACQUISITION,B-3 DATA SYS & CONT BLDG
CD	08702	08	02	M	B	U	09-08-66	RD	WJ KREIM	PDD8000	ACQUISITION,B-3 DATA SYSTEM
CD	09148	31	13	S	D	U	06-15-67	EC	SG JONES	YOS2176	ACTUATOR,BEAM PLASMA PROBE
CD	10129	09	13	S	F	U	11-18-68	NW			ACTUATOR,GENERAL ELECTRIC
CD	09097	22	10	S	A	C	05-18-67	MH	DC WINTERICH	PDD6200	ACTUATOR,SHIM ROD P
CD	08813			S	A	U	11-18-66	AL	GRIFFIN	YOTD265	ACTUATOR MOTOR,PNEUMATIC NUTATING
CD	07520	11	07	S	E	U	09-17-62	AL	FINNEGAN		AERIAL VIEW,LEWIS
CD	07521	11	07	S	E	U	09-17-62	HH	FINNEGAN		AERIAL VIEW,LEWIS
CD	09800	01		S	A	U	05-02-68	MD	GD SHREWSBURY	YOT0282	AERODYNAMIC,AFTERBODY GEOM DETAILS
CD	09797	01		S	A	U	05-02-68	MD	GD SHREWSBURY	YOT0282	AERODYNAMIC,MODEL ASSY-TUNNELSTATION
CD	09799	01		S	A	U	05-02-68	MD	GD SHREWSBURY	YOT0282	AERODYNAMIC,MODEL BASE GEOM DETAILS
CD	09798	01		S	A	U	05-02-68	MD	GD SHREWSBURY	YOT0282	AERODYNAMIC,MODEL OF WING SIMULATOR
CD	10017	34	03	S	B	X	07-22-68	DS	HL WOHL	YOM1315	AFFECTED,POP AREA ISOPLETH ILLUSTR
CD	09802	01		S	A	U	05-02-68	MD	GD SHREWSBURY	YOT0282	AFTERBODY,INSTRUMENTATION DETAILS
CD	05797	28	07	H	D		7-30-67	EC			AFTERBURNER SLEEVE MFOLD BURNER
CD	05800			S							

(c) Alphabetical, by description (field K).

Figure 3. - Sample of the three forms of illustration data printout (IDP).

The master card deck used to make up the IDP is used to reproduce the second deck of cards called a "slave deck," this deck is an electronic reproduction of fields A, B, C, D, K, and the year only.

Note that microfilm is assembled into aperture cards after they are run through the electronic and the sorting machines to lessen the chance of jaming cards in these machines.

Aperture cards are filed by schedules C and D in the Illustration Section master file and the satellite file, with all the microfilm pictures of aircraft, spacecraft, facilities etc. placed in their own groups so that an author can search and compare. If he finds an illustration that can be reused or revised, he can order work copies through the Illustration Section by the drawing file number (see field B).

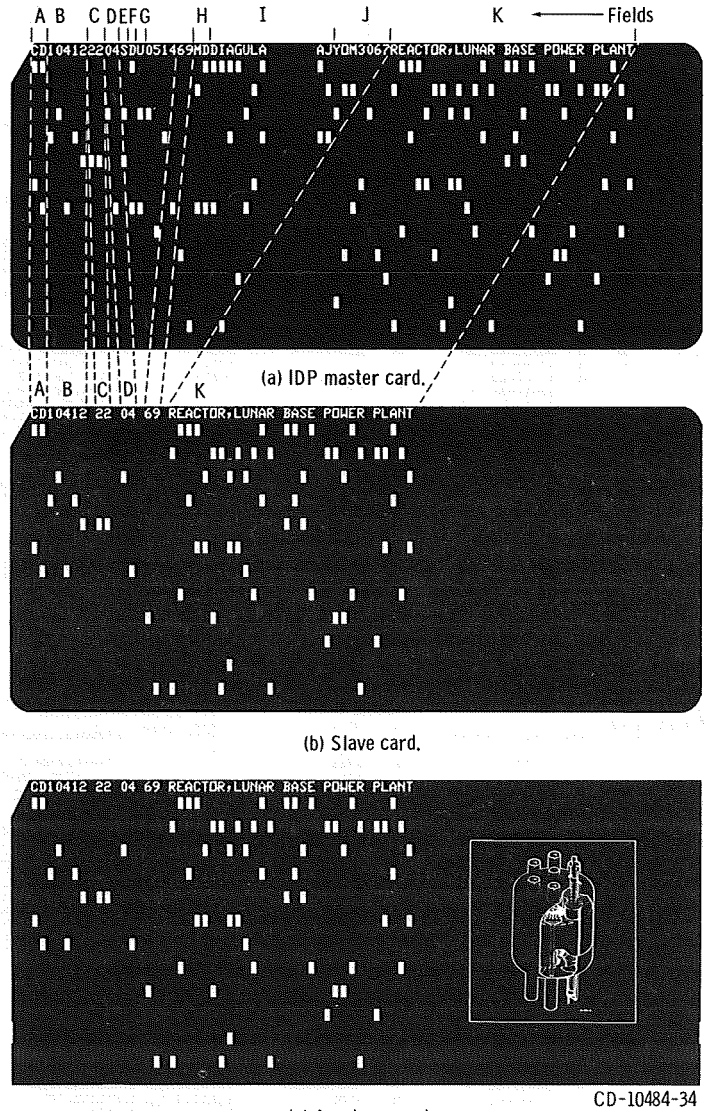
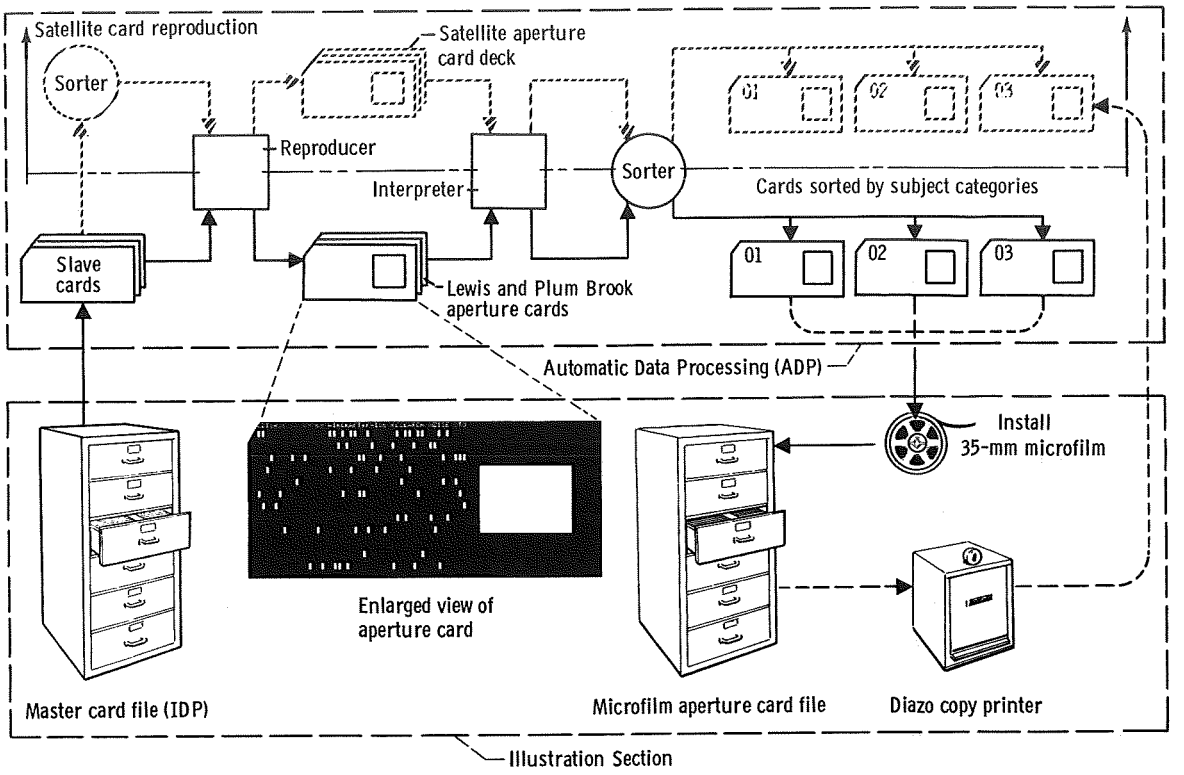


Figure 4. - Three forms of machine-readable cards.



(a) Procedural steps for assembling aperture cards.

(b) Author scans aperture cards in a particular subject category.

Figure 5. - Microfilm program.

GENERAL SYSTEM CHARACTERISTICS

The Graphic Information Processing System is for the storage, dissemination, and the retrieval of stored information in response to requests. It is similar in most respects to current systems using electronic data processing methods. Figure 1 shows the system in diagrammatic form.

Because the Graphic Information Processing System is intended to be of service to Lewis users, it must respond to their needs as identified by the system notation. The profile of this derived code can be found in the input data form, which is the basis for punching the machine-readable cards.

The identification input data form, which is completed by the Illustration Section, is set up as follows:

Columns 1 and 2: PREFIX. Alphabetical only. Identifies the NASA Center originating the individual graphic. Refer to field A.

Columns 3 through 7: ILLUSTRATION FILE NUMBER. Numerical only. Copies of artwork should be ordered by this number. Refer to field B.

Columns 8 and 9: SUBJECT CATEGORY. Numerical only. This is the NASA 34 Distribution Categories (NASA Facility Form 712). Refer to field C.

Columns 10 and 11: NASA SCAN. Numerical only. Is a catalog of 186 topics in selected subject areas within the 34 subject categories. Refer to field D.

Column 12: ILLUSTRATION SIZE. Alphabetical only. Refer to field E.

Column 13: TYPE OF GRAPHIC. Alphabetical only. Identifies the particular category of the graphic as derived from field F. In figure 6 various configurations are illustrated to help the searcher.

Column 14: CLASSIFICATION. Alphabetical only. Identifies the security classification of the particular graphic. Refer to field G.

Columns 15 through 20: DATE. Numerical only. Identifies the date of origination for the graphic. No field, identification self-explanatory. (Month, day, year).

Columns 21 and 22: ILLUSTRATOR. Alphabetical only. Identifies the originator of the graphic - can be illustrator, other graphic sections, or contractor. Refer to field H.

Columns 23 through 37: SENIOR AUTHOR OR PROJECT ENGINEER. Alphabetical only. Identifies the originating author or project engineer by name. In the event an individual's name exceeds the fifteen columns, the name is expressed in the usual manner but with the vowels deleted. Columns 36 and 37 are used only for the first and second initial to further differentiate persons having similar last names. Refer to field I.

[1]Columns 38 through 44: JOB ORDER or E-NUMBER. Identifies the specific accounting charge supporting work to which the graphic is related, or the E-number assigned by the Report Control Section of the Management Services Division. Refer to field J.

Columns 45 through 80: DESCRIPTION. Alphabetical. Identifies the graphic; in most cases the KEYWORD is within the 34 NASA distribution or subject categories. Refer to field K.

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[1]If there has been an E-number assigned it should be used in preference to the job order.

CODING FIELDS

Field A: NASA Center installation code (prefix)

A	Ames Research Center	H	Marshall Space Flight Center
B	NASA Headquarters	J	Jet Propulsion Laboratory
C	Lewis Research Center	K	John F. Kennedy Space Center
F	Flight Research Center	L	Langley Research Center
G	Goddard Space Flight Center	M	Manned Spacecraft Center

Lewis Research Center Code (see table on p. 39 for complete breakdown)

C	Cleveland Photograph	(Photographic Branch)
CD	Cleveland Drawing	(Illustration Section)
CS	Cleveland Slide	(Statistical Drafting Section)

Field B: Illustration file number (shown as DRAW NUM on printout)

Illustration file number is a 5-digit series from number 1 through 99, 999. Original art and 8 by 10 negatives are filed numerically in the Illustration Section master file.

Field C: NASA subject or distribution categories (Subject category)

01	Aerodynamics	18	Materials, Nonmetallic
02	Aircraft	19	Mathematics
03	Auxiliary Systems	20	Meteorology
04	Biosciences	21	Navigation
05	Biotechnology	22	Nuclear Engineering
06	Chemistry	23	Physics, General
07	Communications	24	Physics, Atomic, Molecular, and Nuclear
08	Computers	25	Physics, Plasma
09	Electronic Equipment	26	Physics, Solid State
10	Electronics	27	Propellants
11	Facilities, Research and Support	28	Propulsion Systems
12	Fluid Mechanics	29	Space Radiation
13	Geophysics	30	Space Sciences
14	Instrumentation and Photography	31	Space Vehicles
15	Machine Elements and Processes	32	Structural Mechanics
16	Masers	33	Thermodynamics and Combustion
17	Materials, Metallic	34	General

Field D: NASA/SCAN topics (NASA SCAN)

SCAN is a catalog of 186 topics in selected subject areas. (See pp. 12 through 38 for complete list of topics and index.)

Note that we are using NASA/SCAN Topics and its subject index for categorizing and retrieval of graphics and NOT for its original use. Regular SCAN service is arranged on an organizational basis in conjuction with your library.

Field E: Illustration size (Ills size)

S - Small (14 by 20 in.); M - Medium (22 by 29 in.); L - Large (30 by 40 in. or larger)
(Photos are listed under small size.)

Field F: Type of graphic code (see fig. 6) (Type art)

A	Orthographic drawing	G	Flow diagram or steps of procedure
B	Schematic drawing	H	Chart
C	Three-dimensional line drawing	I	Slide
D	Three-dimensional continuous tone	J	Patent drawings (NASA only)
E	Photograph continuous tone	K	Exploded views
F	Retouched photograph	L	Maps, plot plans, and floor plans

Field G: Security classification code (Class)

	General		AEC restricted data
U	Unclassified	X	Confidential Restricted Data (CRD)
C	Confidential	Y	Secret Restricted Data (SRD)
S	Secret	Z	Top Secret Restricted Data (TSRD)
T	Top Secret		
P	Proprietary		

Field H: Illustrator (Artist)

To conserve space on the illustration data printout, the illustrators in the Illustration Section will be identified by initial only, except for the following other groups:

SD	Statistical Drafting	PL	Photo Lab
SP	Special Presentations	OC	Outside Contractor

Field I: Senior author

Senior author, project engineer, and/or inventor will be identified by last name first, then first and second initial.

Field J: Job order or E-number

Job order will be a 7-digit series; it can be verified by the Lewis Finance Division. E-number is assigned by the Report Control Section of the Management Services Division.

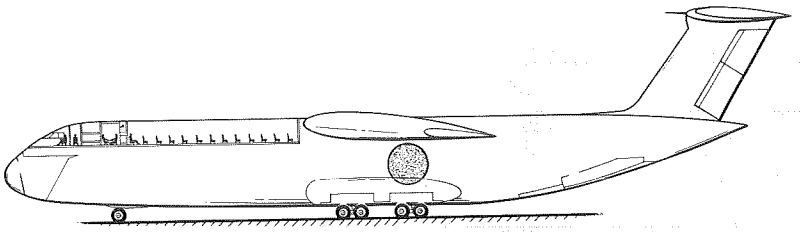
Field K: Description (Keyword, description)

Description will be written on the keyword system, for example,

F-106 SUPERSONIC RESEARCH AIRCRAFT ← Standard writing

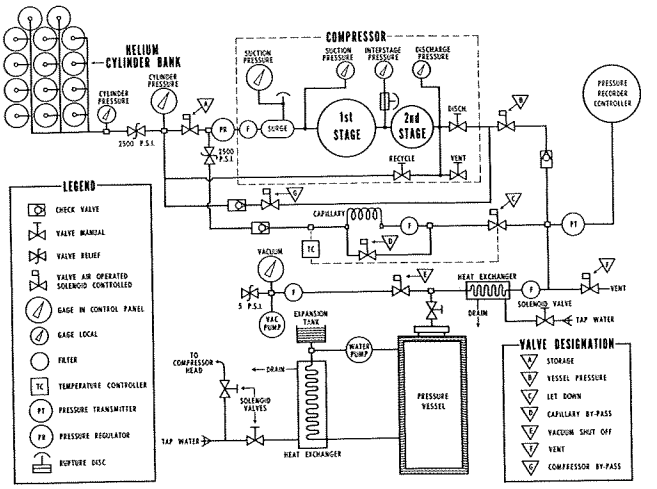
AIRCRAFT, F-106 SUPERSONIC RESEARCH ← Keyword writing

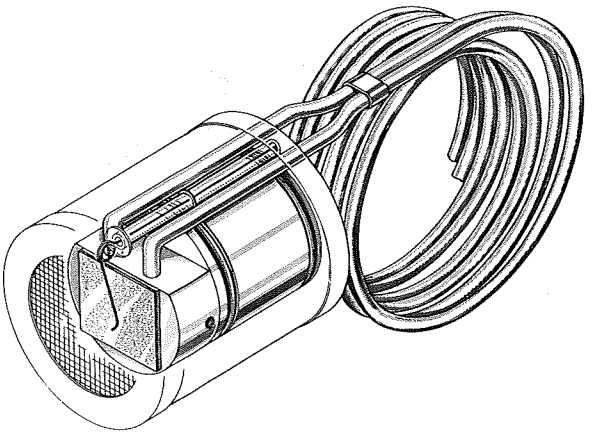
\— Keyword



A Orthographic drawing
Two-dimensional illustrations
in line or tone

B Schematic drawing .....
Electronic, piping, etc.





C Three-dimensional line drawing
Perspective
Isometric
Dimetric
Trimetric

D Three-dimensional
continuous tone
Perspective
Isometric
Dimetric
Trimetric

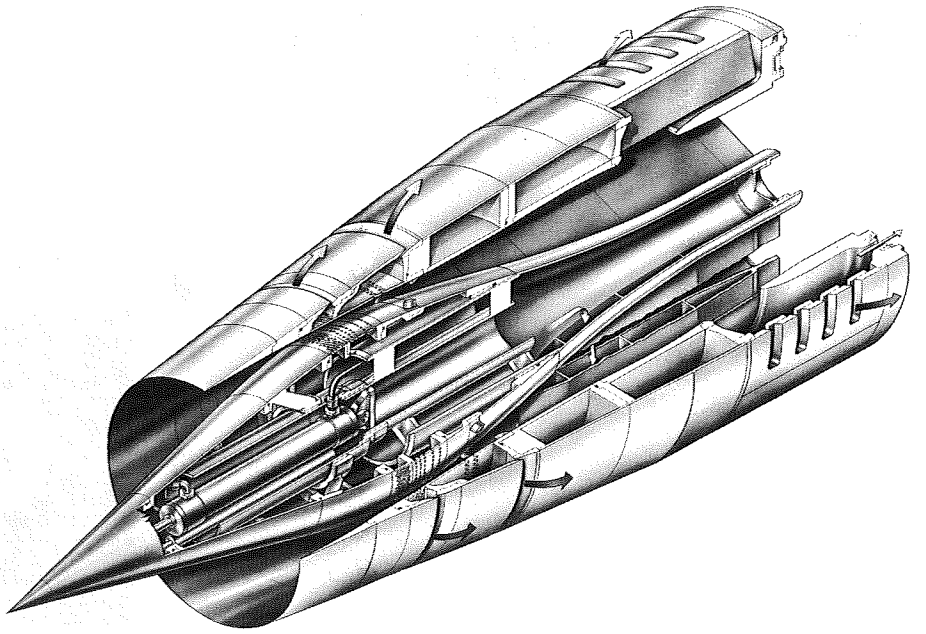
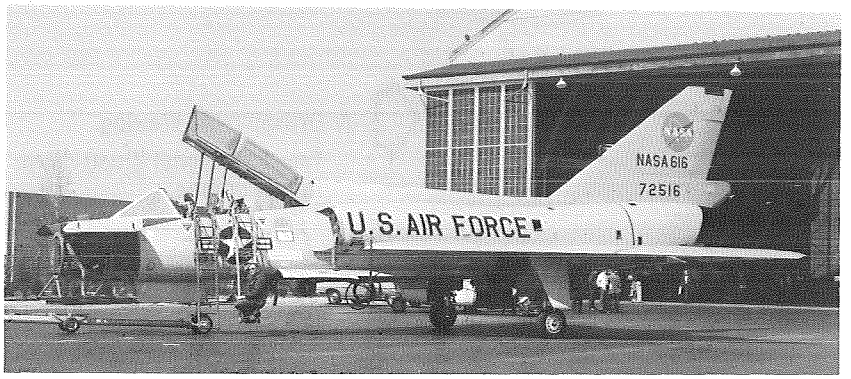
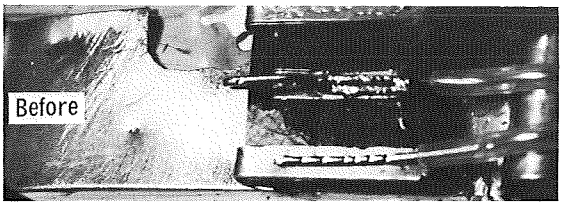


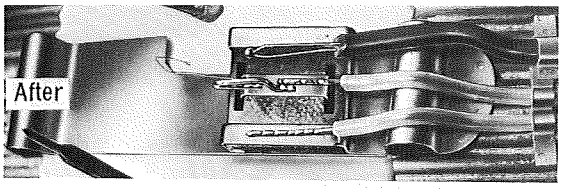
Figure 6. - Types of graphics.

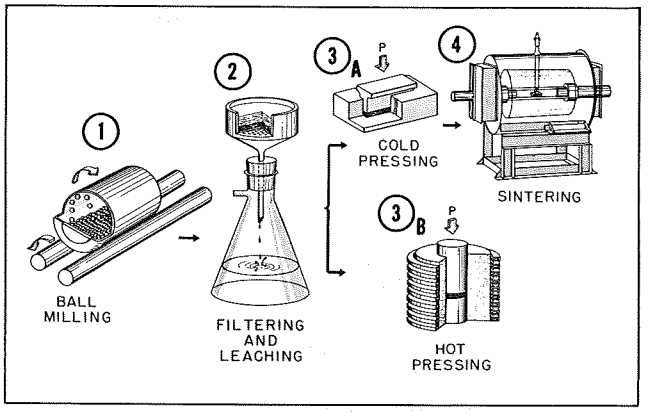


E Photograph - Continuous tone

F Retouched photograph
Clarifies unclear or shadowed areas and removes or adds objects



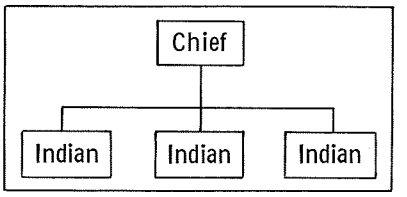




G Flow diagram
Demonstrates flow, movement, or steps of procedure.

H Charts
Usually break down into two groups

Organization charts



Descriptive charts
Usually contain words, symbols, and/or pictures

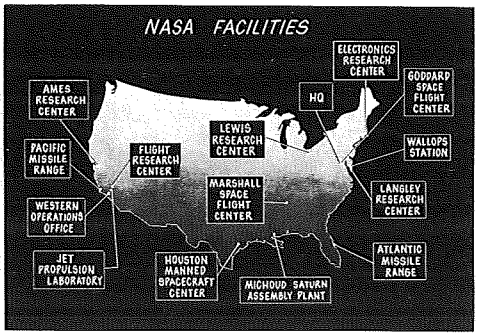
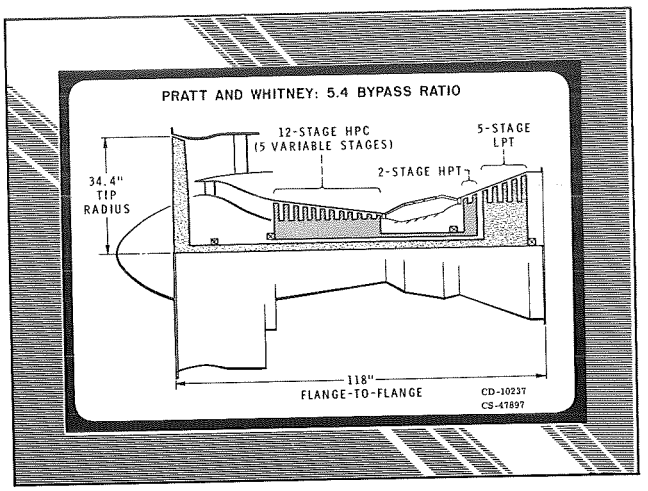
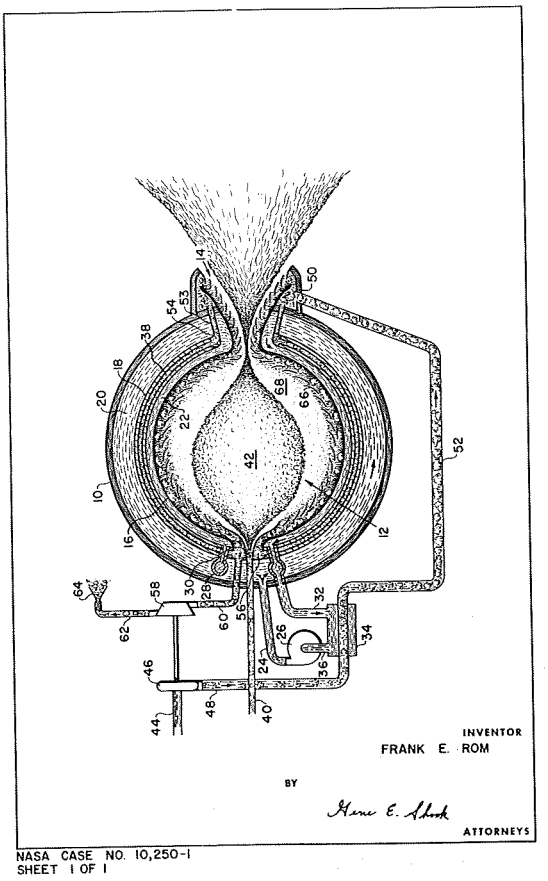


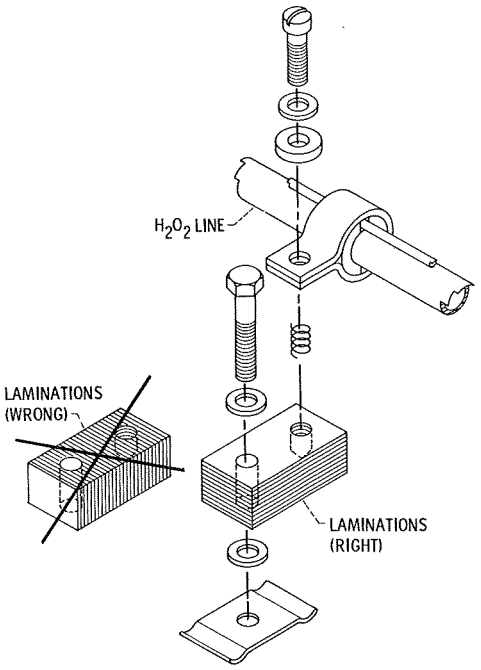
Figure 6. - Continued.



I Slide
View graph,
35 mm, or
$3\frac{1}{4}$ by 4

J Patent drawing





K Exploded views
Three-dimensional in
line or tone

L Maps and plot plans
Two- or three-dimensional
line or tone

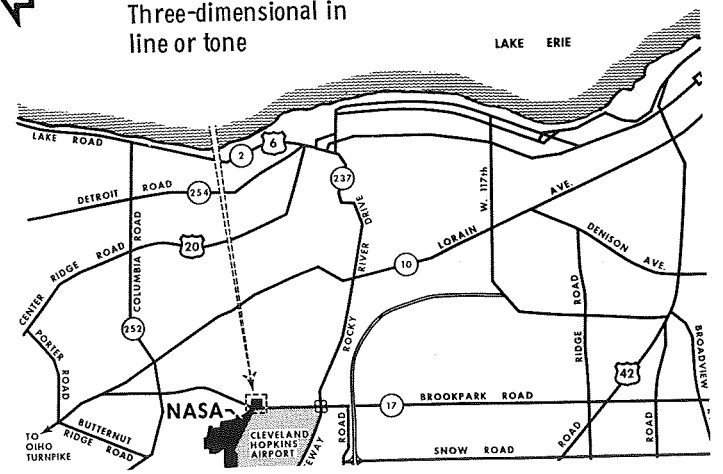


Figure 6. - Concluded.

NASA/SCAN 186 TOPICS

01 AERODYNAMICS

AERODYNAMIC CHARACTERISTICS 01-01

Lift, drag, and factors affecting pitch, roll and yaw.

AERODYNAMICS OF BODIES 01-02

Aerodynamics of bodies of revolution, cylinders, cones and lifting bodies.

AIRFOIL AND WING AERODYNAMICS 01-03

Aerodynamics of wings and airfoil shapes and forms.

RELATED TOPICS:

Wind Tunnels 11-02

Wind tunnel and shock tube installations, test programs, and technology.

Boundary Layer Technology 12-01

Boundary layer flow and mechanics, including boundary layer control, combustion control, separation, transition, and turbulence.

02 AIRCRAFT

COMMERCIAL AND GENERAL AVIATION[1] 02-01

Design, operation and maintenance of specific aircraft used in, or being developed for, civil aviation; airports and facilities; air traffic control and navigation.

HELICOPTERS AND GROUND EFFECT MACHINES 02-05

Helicopters, rotary wing aircraft, ground effect machines, hovercraft, flying platforms, etc.

STOL/VTOL AIRCRAFT 02-07

Aircraft capable of short or vertical takeoffs and landings.

SUPERSONIC TRANSPORT 02-08

Research in supersonic transport types, concepts, specifications, and performances.

AIRCRAFT NOISE AND SONIC BOOM 02-09

Aerodynamics, mechanical and combustion noise generated by aircraft and methods of noise reduction.

AIRCRAFT SAFETY AND SAFETY DEVICES 02-10

Aircraft safety studies, accident investigation, safety techniques and safety devices.

1. New topic.

RELATED TOPIC:

Navigation Systems 21-03

Spacecraft and aircraft navigation systems including star trackers, inertial systems, doppler and stellar navigation; and navigation instruments.

03 AUXILIARY SYSTEMS

FUEL CELLS AND CHEMICAL BATTERIES 03-02

Electrochemical, biochemical and regenerative fuel cells; silver cadmium, nickel-oxide and other batteries.

SOLAR SPACE POWER 03-03

Photovoltaic cells, solar cells, solar energy, absorbing films; solar energy converters and solar power systems.

HYDRAULIC AND PNEUMATIC SYSTEMS 03-04

Hydraulic and pneumatic components, systems, and instrumentation.

AUXILIARY ELECTRICAL SYSTEMS 03-06

Electric auxiliary power supply systems, distribution systems, components, and applications.

RELATED TOPICS:

Nuclear Auxiliary Power 22-04

Nuclear auxiliary reactor, isotopic space power, and specific systems.

Auxiliary Propulsion 28-01

Spacecraft propulsion systems other than the main propulsion system (steering jets, retrorockets, and propulsion units for extravehicular operations).

04 BIOSCIENCES

BIOLOGICAL RADIATION EFFECTS 04-01

Effects of radiation on the human body and other living organisms.

EXTRATERRESTRIAL LIFE 04-02

Exobiology and detection, simulation, and genesis of life outside earth.

CLINICAL MEDICINE 04-03

General medicine, body systems and functions, diseases, and drugs.

AEROSPACE MEDICINE 04-04

Aerospace medical problems and studies, e.g. toxicity and weightlessness; medical aspects of astronaut performance reaction, and neurophysiology.

PHYSIOLOGICAL FACTORS 04-06

Functions related to body composition, physical performance reaction, and neurophysiology.

PSYCHOLOGICAL FACTORS 04-07

Factors related to psychology, psychiatry, individual and group behavior, crew training and testing.

BIOCHEMISTRY 04-09

Chemistry of living organisms and physiochemistry.

BIOLOGY (GEN) 04-11

Microbiology, ecology, botany, genetics and cytology.

RELATED TOPIC:

Chemical Analysis 06-03

Qualitative, quantitative, X-ray, chromatography, and other analytical techniques.

05 BIOTECHNOLOGY

MAN-MACHINE SYSTEMS 05-01

Systems in which man and machine are interrelated.

BIOINSTRUMENTATION 05-02

Biotelemetry, medical electronics, physiological monitors, biological measurement, and biological data handling.

CREW SAFETY AND PROTECTIVE CLOTHING 05-03

Survival techniques, escape, rescue, and protective clothing and equipment.

HUMAN ENGINEERING 05-06

Design and engineering of devices, equipment, and artificial environments to the requirements of man.

LIFE SUPPORT SYSTEMS 05-09

Systems that support life in spacecraft, isolation chambers or uninhabitable environments, including space cabin atmosphere, food, water, and waste disposal.

STERILIZATION 05-10

Spacecraft sterilization, sterilization methods, clean rooms, and contamination control.

CYBERNETICS AND BIONICS 05-12

Methods of control and communications common to living organisms and machines and those systems that function in the manner of or resembling human systems.

06 CHEMISTRY

ELECTROCHEMISTRY 06-02

Electrochemical processes, electrolysis, and electrolytic processes.

CHEMICAL ANALYSIS 06-03

Qualitative, quantitative, X-ray, chromatography, and other analytical techniques.

CHEMICAL PROCESSES AND ENGINEERING 06-05

Chemical processes and specific chemical reactions such as oxidation, nitration, hydrogenation, etc.

LUMINESCENCE [1] 06-06

Chemiluminescence, fluorescence, phosphorescence, bioluminescence, and related topics.

PHOTOCHEMISTRY 06-07

Photolysis, photosynthesis, and actinometry.

RELATED TOPIC:

Biochemistry 04-09

Chemistry of living organisms and physiochemistry.

1. Revised title; formerly CHEMILUMINESCENCE.

07 COMMUNICATIONS

SPACE COMMUNICATIONS 07-01

Reentry, lunar, interplanetary, satellite, and spacecraft communications. Does not include references to Communications Satellites, for which see 07-02.

COMMUNICATION SATELLITES 07-02

SYNCOM, EARLY BIRD, ECHO, TELSTAR, and other communication satellites.

TRACKING 07-03

Tracking installations, personnel, equipment, and systems using radio, radar, infrared, or optical techniques.

COMMUNICATION EQUIPMENT 07-04

Communication equipment, including radio, microwave, infrared, light and television equipment.

COMMUNICATION SYSTEMS 07-05

Types of communication systems; e.g., television, digital, etc., and specific systems; e.g., Defense Communication Systems, Deep Space Network, etc.

TELEMETRY 07-08

Data transmission and measuring, biotelemetry, telephotometry, and telepsychometry.

RADIO NOISE 07-10

Studies of radio noise sources, random noise, signal-to-noise ratio, noise reduction, and noise measurement.

COMMUNICATION THEORY 07-13

Information theory, coding automata theory, signal processing, and decision theory.

RELATED TOPICS:

Radar Equipment 09-02

Radar types, applications and component parts.

Antennas 09-04

Radar and radio antennas and applications.

08 COMPUTERS

DIGITAL AND ANALOG COMPUTERS 08-01

Computer hardware, structure, peripheral equipment, and applications; hybrid computers.

COMPUTER SOFTWARE 08-02

Programming and computer languages, systems analysis, data management.

DATA PROCESSING 08-05

Automatic source data processing, data handling, conversion and compression.

AIRBORNE OR SPACEBORNE COMPUTERS 08-13

Computer design for onboard spacecraft or aircraft use.

09 ELECTRONIC EQUIPMENT

RADAR EQUIPMENT 09-02

Radar types, applications, and component parts.

SEMICONDUCTORS AND TRANSISTORS 09-03

Semiconductors and transistors; types, devices, materials, and applications. See also Solid State Devices 26-03.

ANTENNAS 09-04

Radar and radio antennas and applications.

ELECTRONIC COMPONENTS 09-05

Types, design, applications, packaging, and reliability.

CIRCUITRY 09-07

Circuit theory, production techniques, reliability, protection, and applications. For microcircuits see 10-05 Microelectronics.

ELECTRICAL EQUIPMENT 09-13

Generators, motors, connectors, and insulation; design and application.

AMPLIFIERS 09-15

Types of electronic amplifiers, design, and application. For fluid amplifiers see also 12-07 Fluidics.

RELATED TOPICS:

Auxiliary Electrical Systems 03-06

Electric auxiliary power supply systems, distribution systems, components, and applications.

Communication Equipment 07-04

Communication equipment, including radio, microwave, infrared, light, and television equipment.

10 ELECTRONICS

FEEDBACK AND CONTROL THEORY 10-02

Systems, techniques, and designs.

ELECTROMAGNETIC RADIATION 10-03

Wave propagation, electromagnetic effects, properties, detection, and application.

MICROELECTRONICS 10-05

Microcircuits, microelectronic devices and components, microminiaturized electronic equipment.

11 FACILITIES, RESEARCH AND SUPPORT

WIND TUNNELS 11-02

Wind tunnel and shock tube installations, test programs, and technology. See also Subject Group 01 Aerodynamics.

SIMULATORS AND SIMULATION 11-03

Solar, space, and environment simulators, vacuum chambers, and simulation programs, methods, and technology.

TEST FACILITIES 11-06

Test ranges, centrifuges, engine test stands, rocket test installations, and reactor test facilities.

SPACECRAFT GROUND SUPPORT[1] 11-07

Launch facilities, control networks, vehicle maintenance and servicing. For spacecraft tracking stations and networks, see Topics 07-03 and 07-05.

RELATED TOPICS:

Tracking 07-03

Tracking installations, personnel, equipment, and systems using radio, radar, infrared, or optical techniques.

Communication Equipment 07-04

Communication equipment, including radio, microwave, infrared, light and television equipment.

12 FLUID MECHANICS

BOUNDARY LAYER TECHNOLOGY[2] 12-01

Boundary layer flow and mechanics, including boundary layer control, combustion control, separation, transition, and turbulence.

GAS DYNAMICS 12-03

Applied and theoretical gas dynamics, problem solving, hypersonic and rarefied gas dynamics.

FLUIDICS 12-07

Fluid amplification, fluid logic, circuits, and fluid devices.

FLUID FLOW 12-08

Liquid flow, hydromechanics, and cavitation flow; does not include gas or air flow.

RELATED TOPIC:

Aerodynamic Characteristics 01-01

Lift, drag, and factors affecting pitch, roll and yaw.

1. New title; formerly GROUND SUPPORT SYSTEMS. This topic has been reduced in scope by removing aircraft ground support.

2. New title and scope; formerly BOUNDARY LAYER FLOW. This topic now incorporates the previous topic 12-11, BOUNDARY LAYER MECHANICS.

13 GEOPHYSICS

EARTH RESOURCES[1] 13-01

Earth resources, oceanographic and hydrospheric studies; the role of satellites in oceanography and natural resource development, agriculture, forestry, urban development.

GEODESY AND CARTOGRAPHY 13-02

Geodetic positions, satellite surveying, geodetic applications, mapping techniques, analyzing methods, and mapping systems.

GEOMAGNETISM 13-03

Geomagnetic anomaly, fields, latitudes, pulsations, storms, and measuring and data transmitting instruments.

UPPER EARTH ATMOSPHERE 13-05

Earth atmosphere above the troposphere; ionospheric composition, phenomena, chemical reactions and satellite measurement.

GEOLOGY AND SEISMOLOGY 13-06

Earth geology, petrography, and orography; earthquake detection, measuring and recording instruments, and theoretical models.

GRAVITATION 13-09

Gravitational theory, effect and fields, equations and potential; antigravity, gravitational collapse, and gravity gradient control of satellites.

RELATED TOPICS:

Meteorological Satellites 20-02

Nimbus, Tiros, meteorological data from satellites.

Sounding Rockets 31-09

Upper atmosphere aerology and meteorology probes (Aerobee, Algol, Archer, etc.) and other small launch vehicles.

Radiation Belts 29-03

Inner and outer radiation belts, Van Allen Belt, artificial radiation belts, and trapped radiation.

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1. New title. There has been no change in scope.

14 INSTRUMENTATION AND PHOTOGRAPHY

SPACECRAFT INSTRUMENTATION 14-01

Spacecraft instruments, gauges, indicators, and instrument systems.

SENSORS AND TRANSDUCERS[1] 14-02

Sensing elements used in space vehicles or aerospace services; pressure, temperature, acoustic transducers, etc.

PHOTOGRAPHY 14-08

Cameras and photographic equipment and methods including optical, aerial, and radar photography.

INFRARED TECHNOLOGY 14-10

Infrared devices, including scanners, detectors, filters, cameras, and masers.

INSTRUMENT STANDARDS AND CALIBRATION TECHNIQUES 14-14

Measurement and radiation standards and calibration of instruments.

TEMPERATURE MEASUREMENT 14-15

Heat and temperature measuring devices, applications, and systems.

PRESSURE MEASUREMENT 14-16

Pressure measuring devices, applications, and systems.

DISPLAY SYSTEMS 14-23

Cathode ray tubes and display techniques and principles.

DATA RECORDING 14-24

Data recorders and recording systems and techniques.

RELATED TOPICS:

Bioinstrumentation 05-02

Biotelemetry, medical electronics, physiological monitoring, biological measurement, and biological data handling.

Telemetry 07-08

Data transmission and measuring, biotelemetry, telephotometry, and telepsychometry.

Meteorological Instruments 20-08

Types and uses of meteorological instruments.

Navigation Systems 21-03

Spacecraft and aircraft navigation systems including star trackers, inertial systems, doppler and stellar navigation, and navigation instruments.

1. New title and scope; formerly SENSORS. This topic now incorporates the previous topic 14-03, TRANSDUCERS.

15 MACHINE ELEMENTS AND PROCESSES

BEARINGS AND GEARS 15-01

Types of bearings and gears, uses, materials, and applications.

LUBRICATION AND LUBRICANTS 15-02

Lubrication materials, systems, and applications.

MACHINING 15-03

Machining processes and techniques and machine tools.

FRICTION AND WEAR 15-04

Types of friction, friction measurement and effects, frictionless environment, and wear effects.

SEALS 15-05

Sealants, gaskets, packing, leakage, self-sealing materials, and sealing techniques.

WELDING 15-06

Brazing, bonding, soldering, and welding techniques and processes; weldability of various materials, and properties and characteristics of welds.

METAL FORMING 15-08

Theory, techniques, and processes of metal forming other than machining.

QUALITY CONTROL AND RELIABILITY 15-09

Product development, qualitative testing and analysis of materials and structures, and reliability criteria for components and structures.

PUMPS 15-13

Pumps, pump seals, and pumping in aerospace technology.

VACUUM TECHNOLOGY 15-15

Vacuum systems, techniques and processes; vacuum testing measurement and material fabrication.

NONDESTRUCTIVE TESTING 15-16

Techniques and processes for the nondestructive testing of materials, including infrared, ultrasonic, and X-ray testing.

TURBOMACHINERY [1] 15-17

Axial flow machines, centrifugal compressors and pumps, gas turbines, turbocompressors, turbine pumps, turbofans, turbogenerators.

16 MASERS

LASERS AND MASERS 16-01

References to lasers and masers in general, laser theory, and types of lasers and masers.

LASER APPLICATIONS 16-02

Laser communications, laser photography, and laser ranging.

1. New topic.

17 MATERIALS, METALLIC

ALUMINUM 17-01

Aluminum, aluminum alloys, compounds and powdered aluminum; properties and uses.

BERYLLIUM 17-02

Beryllium, beryllium alloys and compounds; properties and uses.

LIQUID METALS 17-05

Characteristics, properties, technology, and uses of liquid metals.

STEEL 17-08

Types of steel and stainless steel alloys; properties and uses.

TITANIUM 17-10

Titanium and titanium alloys, properties and uses.

REFRACTORY METALS 17-12

Refractory metals and alloys, and superalloys; properties and uses.

METALLURGY 17-13

Powder metallurgy, sintering, fractography and metallography.

CORROSION 17-19

Metal corrosion, stress corrosion, corrosion prevention, and tests for corrosion.

METAL CRYSTALS 17-22

Structure, defects, and technology of metal crystals.

18 MATERIALS, NONMETALLIC [1]

ADHESIVES 18-01

Types of adhesives, properties and uses.

CERAMICS 18-03

Specific ceramics, properties, and uses.

COATINGS 18-04

Types of coatings, properties and uses; coating techniques.

ELASTOMERS 18-05

Specific elastomers, properties and uses.

GRAPHITE 18-07

Graphite, pyrolitic graphite, pyrographic alloy; properties and uses.

POLYMERS 18-09

Types of polymers, properties and uses; polymer chemistry and polymer physics.

1. A previous topic in this group, 18-24, THERMAL INSULATION, has been incorporated into topic 33-05, THERMAL PROTECTION.

PLASTICS 18-12

Specific plastics, thermoplastics, resins, thermosetting plastics, high temperature plastics, silicones and styrenes; properties and uses.

REINFORCED MATERIALS AND FIBERS[1] 18-20

Materials reinforced by inclusions, fiber reinforcement, whiskers, filament wound vessels. See also Topic 18-21, Composite Materials.

COMPOSITE MATERIALS 18-21

Types of composite materials, including laminates, sandwich materials and cermets; properties and uses.

RELATED TOPICS:

Thermal Protection 33-05

Methods and materials used in thermal insulation and protection and for various types of cooling.

Ablation 33-07

Ablation studies, ablating materials, and applications to reentry vehicles and rocket nozzles.

19 MATHEMATICS

APPLIED MATHEMATICS 19-01

Mathematical applications in physical, biological and aerospace sciences.

CELESTIAL MECHANICS AND ORBITAL CALCULATIONS 19-06

Mathematical calculations for celestial mechanics, spacecraft orbits and spacecraft and ballistic trajectories.

NUMERICAL ANALYSIS 19-03

Mathematical models, theoretical studies and applications.

PROBABILITY AND STATISTICS 19-10

Statistical techniques and applications, probability and reliability theory, probability equations, and problem solving.

1. New title and scope; formerly REINFORCED MATERIALS. This topic now incorporates the previous topic 18-06, FIBER TECHNOLOGY.

20 METEOROLOGY

METEOROLOGICAL SATELLITES 20-02

Nimbus, Tiros, meteorological data from satellites.

WEATHER FORECASTING 20-04

Methods and instruments of weather data acquisition and processing; theory and methods of weather prediction.

MICROMETEOROLOGY 20-06

Smallest scale observation of physical and dynamic occurrences within the surface boundary layer of the atmosphere; includes turbulence, air pollution, launch conditions.

CLOUD RESEARCH 20-07

Types of cloud formation, cloud physics, nephanalysis, and cloud seeding.

METEOROLOGICAL INSTRUMENTS 20-08

Types and uses of meteorological instruments.

CLEAR AIR TURBULENCE 20-10

Causes, effects, and methods of detection.

RELATED TOPIC:

Upper Earth Atmosphere 13-05

Earth atmosphere above the troposphere; ionospheric composition, phenomena, chemical reactions and satellite measurement.

21 NAVIGATION

NAVIGATION SYSTEMS 21-03

Spacecraft and aircraft navigation systems including star trackers, inertial systems, doppler and stellar navigation; and navigation instruments.

GUIDANCE SYSTEMS 21-06

Spacecraft guidance and control, midcourse guidance and reentry guidance, and spacecraft guidance systems.

RENDEZVOUS AND DOCKING 21-07

Rendezvous guidance, rendezvous trajectories and docking techniques.

22 NUCLEAR ENGINEERING

NUCLEAR PROPULSION 22-02

Nuclear rocket engines, specific reactors, ground and flight tests.

NUCLEAR AUXILIARY POWER 22-04

Nuclear auxiliary reactors, isotopic space power, and specific SNAP systems.

NUCLEAR RADIATION HAZARDS 22-05

Nuclear reactors and radioactivity hazards, shielding, safety precautions and monitoring instruments.

REACTOR FUELS 22-10

Fuel characteristics, elements, and development.

23 PHYSICS, GENERAL

LIGHT 23-01

Light scattering, measurement effects and transmission.

ACOUSTICS 23-03

Acoustic attenuation, simulation, scattering radiation and vibration; hydroacoustics.

CRYOGENICS 23-04

Low temperature research. For cryogenic propellants see 27-01.

OPTICS 23-06

Optical equipment and technology, electron optics, crystal optics, fiber optics, and optical properties.

ULTRASONICS 23-08

Use in medicine and materials research, absorption properties and effects.

MAGNETISM 23-16

Theory and research, aeromagnetism, ferromagnetism, hydromagnetism, paramagnetism, and thermomagnetism.

MICROWAVE AND SUBMILLIMETER WAVE TECHNOLOGY 23-18

Microwave research, measurement techniques, generation, modulation, and absorption.

RELATED TOPICS:

Stellar Astronomy and Cosmology 30-02

Stellar, galactic astronomy, including radioastronomy; origin and evolution of the universe.

Solar and Planetary Astronomy 30-08

Solar activity, physics, solar telescopes and observatories, planetary compositions, surfaces, atmospheres.

Combustion Physics 33-01

Combustion phenomena, kinetics, instability, detonation, and theory.

24 PHYSICS, ATOMIC, MOLECULAR, AND NUCLEAR

ATOMIC PHYSICS 24-01

Atomic theory, collision, beams, energy, reactions, and properties.

MOLECULAR PHYSICS 24-02

Molecular theory, energy, structure, collision, beams, properties, molecules, and instrumentation.

NUCLEAR PHYSICS 24-03

Nuclear particles, structure, reactions, and force.

RADIOACTIVITY 24-08

Measurement, detection, material, waste, fission products, and radioactive elements.

RELATED TOPIC:

Electromagnetic Radiation 10-03

Wave propagation, electromagnetic effects, properties, detection, and application.

25 PHYSICS, PLASMA

MAGNETOHYDRODYNAMICS 25-01

Magnetohydrodynamic theory and applications.

PLASMA APPLICATIONS 25-02

Plasma arc welding, plasma spraying, plasma power source, plasma jet technology.

PLASMA DYNAMICS 25-03

Plasma theory, conductivity, diagnostics, plasma pinch, plasma sheath, plasma waves, and plasma oscillations.

ASTROPHYSICAL PLASMAS 25-11

Solar, cosmic, and interstellar plasmas, solar atmosphere, and stellar plasma.

26 PHYSICS, SOLID-STATE

SUPERCONDUCTIVITY 26-02

Superconductivity, superconducting magnets, superconducting transition temperatures, critical temperatures, and critical field curves of superconducting material.

DIELECTRICS 26-05

Dielectric material including dielectric constant of materials, electric losses and ohmic resistance of compounds, permeability and polarization of dielectric substances and media.

SOLID STATE DEVICES 26-03

Devices using solid state components, diodes, and rectifiers.

EPITAXIAL DEPOSITION 26-08

Epitaxial film deposition techniques; electrical properties of epitaxial deposited films and applications.

RELATED TOPIC:

Semiconductors and Transistors 09-03

Semiconductor and transistor types, devices, materials, and applications.

27 PROPELLANTS

LIQUID PROPELLANTS 27-01

Cryogenic, hydrogenic, and thixotropic propellants; uses, properties, manufacture, storage and handling; oxidizers and igniters used with liquid propellants.

SOLID PROPELLANTS 27-02

Types, uses, properties; manufacture, storage and handling, propellant grain studies, and oxidizers and igniters used with solid propellants.

28 PROPULSION SYSTEMS

AUXILIARY PROPULSION 28-01

Spacecraft propulsion systems other than the main propulsion system (i.e. steering jets, retrorockets, and propulsion units for extra-vehicular operations).

ELECTRIC PROPULSION 28-02

Propulsion systems by charged electrical particles accelerated by electrical or magnetic fields; includes electromagnetic and electrostatic propulsion.

JET PROPULSION 28-07

Turbojet, pulsejet, and ramjet propulsion systems including specific engines.

ROCKET ENGINES, NOZZLES AND THRUST CHAMBERS 28-14

Specific engines used in rocket propulsion, nozzle and thrust chamber design, materials, and performance.

RELATED TOPIC:

Nuclear Propulsion 22-02

Nuclear rocket engines, specific reactors, ground and flight tests.

29 SPACE RADIATION

COSMIC RADIATION 29-01

Primary and secondary cosmic radiation, galactic and stellar radiation.

SOLAR RADIATION AND ACTIVITY 29-02

Solar radiation, observation, instrumentation, hazards to space flight, protection from solar radiation, solar storms, solar flares, solar winds, and sunspots.

RADIATION BELTS 29-03

Inner and outer radiation belts, Van Allen Belt, artificial radiation belts, and trapped radiation.

30 SPACE SCIENCES

STELLAR ASTRONOMY AND COSMOLOGY[1] 30-02

Stellar, galactic astronomy, including radioastronomy; origin and evolution of the universe.

LUNAR AND PLANETARY EXPLORATION 30-03

Lunar and planetary environment, spacecraft and vehicles used in exploration, specific projects, and lunar and planetary landings.

LUNAR SURFACE 30-05

Studies of the lunar surface and lunar surface data.

METEORS AND METEORITES 30-06

Meteor properties and hazards, micrometeoroids and micrometeorites.

SOLAR AND PLANETARY ASTRONOMY[2] 30-08

Solar activity, physics, solar telescopes and observatories, planetary compositions, surfaces, atmospheres.

RELATED TOPICS:

Space Probes 31-12

Lunar and planetary probes, including Pioneer, Ranger, Mariner, Voyager, and deep space probes.

Astrophysical Plasmas 25-11

Solar, cosmic, and interstellar plasmas, solar atmosphere, and stellar plasma.

31 SPACE VEHICLES

APOLLO AND GEMINI PROJECTS[3] 31-01

All aspects of the Apollo and Gemini spacecraft and programs.

LAUNCH VEHICLES 31-03

Atlas, Saturn, Titan, other large and medium launch vehicles.

REENTRY VEHICLES 31-06

All vehicles and maneuverable vehicles capable of entering a planetary atmosphere, also decelerators, drogues and other devices used with reentry vehicles.

1. New title and scope; formerly ASTROPHYSICS AND ASTRONOMY.
2. New title and scope; formerly ASTRONOMY. The stellar, astrophysics and cosmology coverage of the previous topic are now incorporated in topic 30-02.
3. New title and scope, formerly APOLLO PROJECT. This topic now incorporates the previous topic 31-02, GEMINI PROJECT.

MANNED SPACECRAFT 31-07

Spacecraft and orbiting laboratories, planet fly-by excursion vehicles, post-Apollo manned program. Does not include Apollo and Gemini projects.

SOUNDING ROCKETS 31-09

Upper atmosphere aerology and meteorology probes (Aerobee, Algol, Archer, etc.,) and other small launch vehicles.

SPACE PROBES 31-12

Lunar and planetary probes, including Pioneer, Ranger, Mariner, Voyager, and deep space probes.

SCIENTIFIC SATELLITES 31-13

Geophysical and astronomical satellites, orbiting observatories, Discoverer and Explorer satellites.

EXTRAVEHICULAR OPERATIONS 31-14

Astronaut operations outside the spacecraft, space repair, space tools, astronaut propulsion units.

SPACECRAFT ATTITUDE CONTROL AND STABILIZATION 31-15

Attitude control systems, stability techniques, and instrumentation.

U.S.S.R. SPACECRAFT[1] 31-21

All U.S.S.R. spacecraft and programs, manned and unmanned.

RELATED TOPICS:

Communication Satellites 07-02

SYNCOM, EARLY BIRD, ECHO, TELSTAR, and other communication satellites.

Spacecraft Instrumentation 14-01

Spacecraft instruments, gauges, indicators, and instrument systems.

SPACECRAFT GROUND SUPPORT 11-07

Launch facilities, control networks, vehicle maintenance and servicing. For spacecraft tracking stations and networks, see Topics 07-03 and 07-05.

Meteorological Satellites 20-02

Nimbus, Tiros, and meteorological data from satellites.

1. New title, formerly RUSSIAN SPACECRAFT. There has been no change in scope.

32 STRUCTURAL MECHANICS

SHELLS 32-01

Shell structures, stresses, loads, buckling and vibration.

STRESSES AND LOADS 32-02

Stresses and loads on launch vehicles, spacecraft, and aerospace structures.

STRUCTURE VIBRATION AND DAMPING 32-04

Vibration and damping in aerospace structures, spacecraft and airframes; panel flutter.

IMPACT PHENOMENA 32-07

Studies of impact phenomena in aerospace structures and components; also micrometeoroid impact damage.

STRUCTURAL FATIGUE 32-09

Fatigue studies and analysis, techniques for aerospace structures and components.

SANDWICH CONSTRUCTION 32-13

Honeycomb, multilayer and laminated fabrication, techniques and structures.

STRESS ANALYSIS 32-14

Stress calculation and analysis of structures.

STRUCTURAL TESTS AND RELIABILITY 32-15

Destructive and nondestructive testing and reliability of aerospace structures.

33 THERMODYNAMICS AND COMBUSTION

COMBUSTION PHYSICS 33-01

Combustion phenomena, kinetics, instability, detonation, theory.

HEAT TRANSFER, BASIC 33-03

Characteristics and studies of various forms of heat transfer, heat dissipation, and heat resistance.

REENTRY HEAT TRANSFER 33-04

Heat transfer problems on reentry and their solution.

THERMAL PROTECTION[1] 33-05

Methods and materials used in thermal insulation and protection and for various types of cooling.

ABLATION 33-07

Ablation studies, ablating materials, and application to reentry vehicles and rocket nozzles.

1. This topic now incorporates the previous topic 18-24, THERMAL INSULATION.

34 GENERAL

AEROSPACE MANAGEMENT 34-03

Management techniques, cost control, production engineering, personnel management.

WORLD SPACE PROGRAMS AND AEROSPACE LAW 34-04

NASA programs in general, foreign aerospace programs, international cooperation, law related to space and aeronautics, Congressional aerospace hearings. General references to U.S.S.R. programs are included in this topic, but for references to all U.S.S.R. spacecraft, use topic 31-21, U.S.S.R. Spacecraft.

INFORMATION TECHNOLOGY 34-05

Documentation, information processing and retrieval, and information systems.

NASA/SCAN INDEX

S

T

U

V

W

X

APPENDIX A- CROSS REFERENCE LIST

The cross reference list eliminates the duplication of slides and/or illustrations. A quick check of the list immediately tells if a slide has been made of the requested graphic. It also allows the author to obtain the latest updated graphic.

Although many Lewis authors are not in general communication with each other (because of the large complex of buildings and the separation of the Lewis Research Center from the Plum Brook Station) but are working in related fields, they may have need of the same graphics. For example, over a period of time one facility may be used by authors working in several different fields. When they write their reports, they may want to include an illustration or photograph of the facility.

The cross reference list, which is made from input supplied by the Illustration and the Statistical Drafting Sections, is run through the automatic data processing equipment (ADP; see fig. 7) (Computer run time is not used). The list is run in two forms: First, it is sorted numerically by field A (illustration number); and, second, it is sorted numerically by field B (slide number). This list is presently being used by the Lewis Photographic Branch, Illustration Section, and Statistical Drafting Section. (See the following table for control numbers and prefixes.)

Field	Control number	Prefix definition	Section or Branch
A	CD-00000-00	Cleveland drawing	Illustration Section
	CP-00000-00	Cleveland drawing for Plum Brook	Illustration Section
B	CS-00000	Cleveland slide	Statistical Drafting Section
C	C-00-0000	Cleveland photo	Photographic Branch
D	P-00-0000	Plum Brook photo	Photography Laboratory
E	E-0000	Lewis control number	Report Control

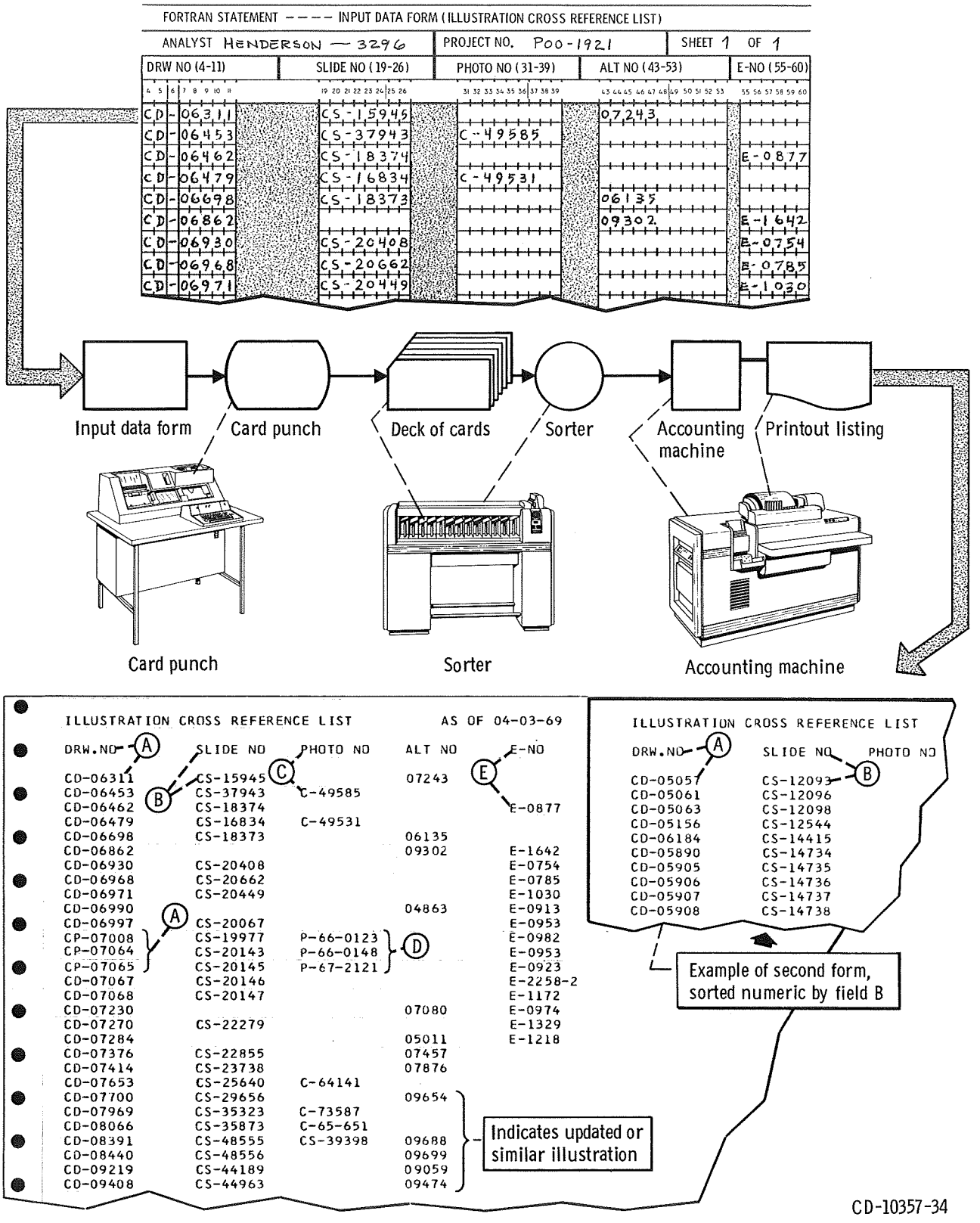
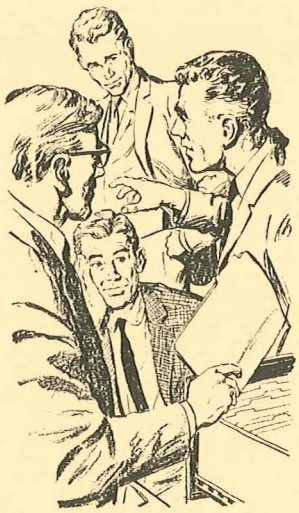


Figure 7. - Automatic data processing (ADP) of illustration cross reference list. (See table on p. 39 for field clarification.)

AUTHORS PLEASE NOTE



HELP US RETRIEVE YOUR GRAPHICS:

If you use a portion or all of a previous illustration, figure, photograph, or slide in a new report or presentation, be sure to reference all the applicable control numbers. The graphics filed in the various branches of the Management Services Division number in the thousands.

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